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DC COURTS

Disciplined Processes Critical to Successful System Acquisition

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United States General Accounting Office
Washington, DC 20548

February 28, 2002

The Honorable Joe Knollenberg
Chairman
Subcommittee on the District of Columbia
Committee on Appropriations
House of Representatives

Dear Mr. Chairman:

This letter responds to your August 20, 2001, request that we perform an initial review of the District of Columbia Courts' (DC Courts) effort to acquire a new information system. Faced with a myriad of nonintegrated systems that do not provide the necessary information to support its overall mission, the DC Courts is in the process of acquiring a replacement system called the Integrated Justice Information System (IJIS). This system is expected to address the current system's deficiencies and provide DC Courts with the information it needs to perform its mission. The District of Columbia Appropriation Act, 2001,[1] provides that none of the funds in the act or in any other act shall be available for the purchases, installations, or operation of IJIS until a detailed plan and design has been submitted by DC Courts and approved by the House and Senate committees on appropriations. DC Courts is in the initial stages of the system acquisition effort—developing a request for proposal (RFP) to solicit bids from vendors for the design and implementation of the new system.[2] As required, this detailed plan and design, which includes a draft RFP, was submitted to the appropriations committees on May 17, 2001, for review.

Specifically, we assessed whether

1. DC Courts has implemented the disciplined processes for this project to reduce the risk associated with this effort to acceptable levels;

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[1] Public Law No. 106-522, 114 Stat. 2440, 2442 (2000).

[2] An RFP is a formal request for vendors to provide a solution to a stated problem, in this case, a system to handle DC Courts' management information needs.

2. DC Courts' requirements to acquire the system, as identified in its draft RFP, contain the necessary specificity to reduce the risks from requirement defects to acceptable levels;[3] and

3. DC Courts has performed the necessary actions to determine that a commercial off-the-shelf system (COTS) would meet its needs.

Results in Brief

DC Courts has not yet implemented the disciplined processes necessary to reduce the risks associated with acquiring and managing the IJIS acquisition effort to acceptable levels. A disciplined software development and acquisition process maximizes the likelihood of achieving the intended results (performance) within established resources (costs) on schedule. DC Courts officials acknowledged that they do not yet have the disciplined processes in place to reduce the risks from this effort to acceptable levels. However, they also acknowledged that disciplined processes were necessary. They further noted that even though sufficient funding to fully implement disciplined processes would not be available until the system was approved and funded, they had already begun to implement some elements of a disciplined process. For example, at the time of our review, DC Courts was sending several people to be trained and certified in project management skills.

The majority of the DC Courts' requirements, developed for the draft RFP, lacked the necessary specificity to ensure that the defects in these requirements have been reduced to acceptable levels and that the system would meet its users' needs. In addition, the requirements in the draft RFP did not directly relate to industry standards and the terms "customization" and "modification" were not clearly defined in the draft RFP. We also noted that the system requirements were not logically grouped.

DC Courts officials are electing to use the acquisition process to identify the cost, schedule, and performance gaps associated with their effort. DC Courts officials acknowledged that this approach generally increases risk; however, they concluded that the benefit to be obtained—accelerating the implementation of a badly needed system—justifies those risks. At this point in the process, we concur with DC Courts' decision to use the

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[3]Although all projects of this size can be expected to have some requirements-related defects, the goal is to reduce the number of such defects so that they do not significantly affect cost, schedule, or performance.

acquisition process to identify the cost, schedule, and performance gaps in this case because of the following mitigating factors.

- DC Courts officials concluded, based on a qualitative analysis, that they do not have unique requirements that would prevent the utilization of a COTS product. Furthermore, they recognized that a gap analysis must be performed as part of the vendor selection process to identify the cost, schedule, and performance impacts of each vendor's product before deciding which product to acquire.
- DC Courts is still in the early stages of the system acquisition effort and has not yet reached the critical point of contract award. Therefore, a gap analysis can still be performed prior to the system acquisition to ensure that a COTS product can cost effectively meet DC Courts' needs.
- The requirements that had been developed lacked the necessary specificity to perform a meaningful gap analysis. Therefore, the time spent on attempting to perform the gap analysis before issuing the RFP may not have been effective.

As with any effort, alternative approaches need to be analyzed. In this case, DC Courts officials believe that the benefits associated with the reduced risks of performing a detailed gap analysis before the RFP is issued—having a greater assurance that a COTS product would meet their needs—were outweighed by the costs associated with delaying this effort.

During the course of our work, DC Courts officials stated their commitment to go forward with this project only after the necessary actions have been taken to reduce the risks to acceptable levels. We are making recommendations to help ensure that DC Courts adequately (1) adopts and implements disciplined processes to help ensure that its systems development effort is successful, (2) defines the requirements necessary to develop its new system in its RFP, and (3) improves its ability to assess potential solutions. In commenting on a draft of our report, DC Courts agreed with our findings and recommendations and said that it has begun to implement our recommendations to ensure the successful acquisition of IJIS as outlined in our report.

Background

The District of Columbia Court Reform and Criminal Procedure Act of 1970[4] (Court Reform Act) transferred jurisdiction over all local judicial

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[4]Public Law No. 91-358, 84 Stat. 473 (1970).

matters to a unified court system for the District. This entity, known as DC Courts, includes

- the Superior Court, which is the trial court with general jurisdiction over virtually all local legal matters, including criminal, civil, juvenile, domestic relations, probate, and small claims cases, and
- the Court of Appeals, the highest court of the District of Columbia, which reviews all appeals from the Superior Court, as well as decisions and orders of D.C. government administrative agencies.

The Court Reform Act provided for the creation of a policy-making body for DC Courts, the Joint Committee on Judicial Administration. The joint committee, composed of the two chief judges and three associate judges, submits DC Courts' annual budget requests and is responsible for DC Courts' general personnel policies, accounting and auditing, procurement and disbursement, development and coordination of statistical and management information systems and reports, and other related administrative matters. The joint committee appoints the executive officer, who manages the day-to-day administrative and financial management of the court system on the committee's behalf.

The National Capital Revitalization and Self-Government Improvement Act of 1997[5] (Revitalization Act) changed DC Courts' funding process, nonjudicial employee compensation, and functional responsibilities. The Revitalization Act provides for direct federal funding of DC Courts. The joint committee submits DC Courts' budget request to the Congress through the director of the Office of Management and Budget (OMB). In addition, some DC Courts activities were transferred to the federal government.

DC Courts' Effort to Acquire New Information System

In October 1998, the Superior Court of the District of Columbia launched the IJIS project to upgrade and enhance its information management capabilities and establish a unified, fully integrated computer system that would support data collection and exchange for all types of cases processed within the Superior Court. IJIS is a multiyear initiative with a two-fold purpose: first, to improve data collection and exchange within and across DC Courts' multiple divisions, which process different types of cases and provide essential support services, such as research and development and information technology, and second, to improve

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[5]Public Law No. 105-33, Title XI, 111 Stat. 251, 712 (1997).

interagency data collection and exchange among the District's criminal justice agencies. Currently, DC Courts information management resources are divided among 18 different computer systems that have evolved over the past 20 years in response to the differing needs of particular court divisions. DC Courts' IJIS initiative is part of a District-wide effort to improve the data collections systems and infrastructure of District criminal justice agencies and enhance data exchange among those agencies.

The District of Columbia Appropriations Act, 2000,[6] provided that, of the amounts available for operations of DC Courts, an amount not to exceed $2.5 million would be used for the design of IJIS. Due to the time needed to prepare a detailed requirement analysis to guide the system design, no contract was awarded or funds spent during fiscal year 2000. As a result, DC Courts officials requested the $2.5 million to design the new system in the fiscal year 2001 capital budget.

DC Courts has financed an IJIS requirements analysis through a $350,000 grant from the U.S. Department of Justice's Edward Byrne Memorial State and Local Law Enforcement Assistance Formula Grant Program through a subgrant of the D.C. Office of Justice Grants Administration. DC Courts subsequently awarded a contract to conduct the IJIS requirements analysis, with the following objectives: (1) assess the DC Courts' existing technology infrastructure and systems and core business processes supported by these systems, (2) determine critical information management needed, and (3) recommend technical and business process solutions that would cost effectively meet these needs. In September 2000, the contractor issued the final report on the requirements analysis, which was conducted from January through August 2000. The IJIS plan and design prepared by DC Courts is based on the requirements analysis conducted by the contractor.

DC Courts provided its detailed plan and design for the IJIS to the chairmen of the Senate and House appropriations committees on May 17, 2001. On August 20, 2001, we were asked to review the DC Courts' draft RFP for the design and implementation of the new system, in conjunction with the subcommittee's review of the plan and design, before DC Courts began the formal solicitation process.

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[6]Public Law No. 106-113, 113 Stat. 1501, 1502 (1999).

Scope and Methodology

To carry out our objectives, we reviewed and analyzed

- DC Courts' plan and design for the IJIS, including the draft RFP for the design and implementation of the new system;
- DC Courts' annual report;
- industry automation standards published by the National Consortium for Court Functional Standards;[7] and
- reports produced by the contractor related to (1) DC Courts' Integrated Justice Information System Requirements Analysis, (2) Business Process Descriptions, Data Flow Diagrams and Entity Relationship Diagrams, (3) Inventory of Data Elements, and (4) Executive Summary (September 2000).

We discussed the IJIS project with the following:

- the chief judge, Superior Court of the District of Columbia;
- a member of the Technology and Automation Committee;
- the executive director, DC Courts;
- the clerk of the court;
- the director of Information Technology, Information Technology (IT) Division, Court System;
- the information system administrator, IT Division, Court System;
- other DC Courts personnel; and
- representatives from the contractor who prepared the requirements.

We reviewed and analyzed the draft detailed requirements prepared by the contractor and DC Courts personnel and compared them to industry standards on selected court activities, such as domestic relations and civil cases. We also reviewed the Clinger-Cohen Act of 1996;[8] federal policy governing acquisition efforts, including OMB guidance; and guidance and

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[7]The consortium is a subgroup of the Conference of State Court Administrators and the National Association for Court Management Joint Technology Committee. Its goal is to develop functional standards for case management information systems for civil, domestic relations, criminal, juvenile, probate, and traffic cases.

[8]Public Law 104-106. The Clinger-Cohen Act requires agencies to analyze their missions and, based on the analysis, revise mission-related and administrative processes, as appropriate, before making significant investments in information technology used to support those missions.

best practice literature[9] that the Software Engineering Institute (SEI),[10] the Project Management Institute (PMI),[11] and the Institute of Electrical and Electronics Engineers (IEEE)[12] have issued on evaluating information technology investment.

We did not independently verify or audit the cost data we obtained from DC Courts officials.

Our work was conducted from October 2001 through November 2001 in accordance with U.S. generally accepted government auditing standards. We requested comments on a draft of this report from the Joint Committee on Judicial Administration in the District of Columbia. The joint committee provided us with written comments that are discussed in the "DC Courts Comments" section and are reprinted in appendix I.

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[9]U.S. General Accounting Office, *Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-Making*, GAO/AIMD-10.1.13 (Washington, D.C., 1997); U.S. General Accounting Office, *Executive Guide: Creating Value Through World-class Financial Management*, GAO/AIMD-00-134 (Washington, D.C.: 2000); and U.S. General Accounting Office, *Information Technology: An Audit Guide for Assessing Acquisition Risks*, GAO/IMTEC-8.1.4 (Washington, D.C.: 1992).

[10]SEI is recognized for its experience in software development and acquisition processes. It has also developed methods and models that can be used to define disciplined processes and determine whether an organization has implemented them. SEI's stated mission is to provide leadership in advancing the state of the practice of software engineering and to improve the quality of systems that depend on software.

[11]PMI provides global leadership in the development of standards for the practice of the project management profession throughout the world. PMI's standards document, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, is a globally recognized standard for managing projects in today's marketplace. The *PMBOK® Guide* is approved as an American National Standard by the American National Standards Institute.

[12]Institute of Electrical and Electronics Engineers, *Transactions on Software Engineering* (IEEE Transactions on Software Engineering, volume 14, number 10 1988).

DC Courts Has Not Implemented the Disciplined Processes Necessary to Reduce Risks to Acceptable Levels

DC Courts has not implemented the disciplined processes necessary to reduce risks associated with managing its system acquisition to acceptable levels. However, DC Courts recognizes the importance of these processes and plans to implement them once funding for the project is available.

Disciplined processes have been shown to reduce the risks associated with software development and acquisition efforts to acceptable levels and are fundamental to successful systems acquisition. A disciplined software development and acquisition process is needed to maximize the likelihood of achieving the intended results (performance) within established resources (costs) on schedule. Although a "standard cookbook" of practices that will guarantee success does not exist, several organizations, such as SEI, PMI, and IEEE, and individual experts have identified and developed the types of policies, procedures, and practices that have been demonstrated to reduce development time and enhance effectiveness.

SEI and others have documented the positive effects of disciplined processes and have developed methodologies that can be used to determine whether an organization has such processes. For example, SEI first developed the Capability Maturity Model (CMM) to determine an organization's ability to develop software and has also developed a CMM to assess an organization's ability to acquire software. These methodologies are designed to determine whether an organization has implemented the types of disciplined processes that can lead to lower defect rates and help avoid the adverse impacts associated with common mistakes. Organizations that have focused on improving their processes have found, over time, that they are able to reduce their time to market by about one-half and reduce the costs from defects by factors of 3 to 10.[13]

The key to having a disciplined system development effort is to have disciplined processes in multiple areas. For projects such as the one being undertaken by the DC Courts, these include, at this stage in the acquisition process, project planning, requirements management, project management, configuration management, risk management, and testing. Effective processes should be implemented in each of these areas throughout the project life cycle since constant changes occur. Table 1

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[13]Steve McConnell, *Rapid Development: Taming Wild Software Schedules* (Redmond, Wash.: Microsoft Press, 1996).

provides a brief description of some of the areas that appear critical to the DC Courts' effort.[14]

Table 1: Examples of Disciplined Processes

Discipline	Description
Project planning	Project planning is the process used to establish reasonable plans for performing and managing the software project. This includes (1) developing estimates of the resources needed for the work to be performed, (2) establishing the necessary commitments, and (3) defining the plan necessary to perform the work. Effective planning is needed to identify and resolve problems as soon as possible when it is the cheapest to fix them. According to one author,[a] the average system design and implementation project includes about 80 percent of its time as unplanned rework—fixing mistakes that were made earlier in the project.
Risk management	Risk management is a set of continual activities for identifying, analyzing, planning, tracking, and controlling risks. Risk management starts with identifying the risks before they become problems. If this step is not performed well, the entire risk management process may become a useless exercise since a process cannot be managed without information about that process. As with the other disciplined processes, risk management is designed to eliminate the effects of undesirable events at the earliest possible stage to avoid the costly consequences of rework. After the risks are identified, they need to be analyzed so that they can be better understood and decisions can be made about what actions, if any, will be taken to address the risks. Basically, this step includes such activities as evaluating the impact on the project if a risk does occur, determining the probability of the event occurring, grouping like risks together, and prioritizing the risk against the other risks. Once the risks are analyzed, a risk management plan is developed that outlines the information known about the risks and the actions, if any, that will be taken to mitigate those risks. Risk management is a continual process because the risks and actions planned to address those risks need to be monitored to ensure that the risks are being properly controlled and that new risks are identified as early as possible. If the actions envisioned in the plan are not adequate, then additional controls are needed to correct the deficiencies identified.
Testing	Testing is the process of executing a program with the intent of finding errors.[b] Disciplined system development activities recognize that testing will not find all defects even though well-designed and executed programs are used. For example, testing performed through the system testing phase often catches less than 60 percent of a program's defects.[c] Consequently, testing alone cannot be relied on to identify all defects.

[a]Steve McConnell, *Software Project Survival Guide* (Redmond, Wash.: Microsoft Press, 1998).

[b]Glendford J. Myers, *The Art of Software Testing* (New York, N.Y.: John Wiley and Sons, Inc., 1979).

[c]See footnote 13.

DC Courts officials agreed that they had not yet fully implemented the disciplined processes necessary to reduce the risks associated with this project to acceptable levels. They said that they recognized that the implementation of the disciplined processes was needed not only for this project but for other projects as well, and that effective implementation would take time, management commitment, and funding. They also noted that they had begun the process of identifying the needed funding and

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[14]A list of other processes necessary to acquire or develop systems can be obtained from SEI at www.sei.cmu.edu.

staffing levels and that they were sending several of the project managers to training so that they could become certified project managers, which will facilitate their knowledge of disciplined processes.

DC Courts System Requirements as Specified in RFP Are Inadequate

Requirements represent the blueprint that system developers and program managers use to design, develop, and acquire a system. Requirements should be consistent with one another, verifiable, and directly traceable to higher-level business or functional requirements. It is critical that requirements be carefully defined and that they flow directly from the organization's concept of operations (how the organization's day-to-day operations are or will be carried out to meet mission needs). Improperly defined or incomplete requirements have been commonly identified as a root cause of system failure and systems that do not meet their costs, schedules, or performance goals. Without adequately defined requirements that have been properly reviewed and validated, significant risk exists that the system will need extensive and costly changes before it will meet the DC Courts' needs.

DC Court system requirements set forth in the draft RFP lacked the necessary specificity to ensure that the defects in these requirements have been reduced to acceptable levels and that the system would meet its users' needs. In addition, the terms "customization" and "modification," though used in the RFP, were not clearly defined. Also, industry standards that appeared to be related to the DC Courts were either not used or were summarized so that the detail provided in the standard was omitted from the DC Courts' requirements. We also noted that the requirements were not logically organized—related requirements were not grouped together. Better grouping of requirements would help the DC Courts and potential contractors in assessing whether the RFP's requirements adequately describe the functionality necessary to conduct court business. Because DC Courts' requirements were not specific, were poorly organized, and did not directly relate to industry standards, a significant potential exists that the DC Courts' proposed system may not meet its business needs or may not be delivered on schedule and within budget if corrective action is not taken.

Requirements Management: A Key Process for Quantifying a System's Purpose and Function

Requirements management is a process that establishes a common understanding between the customer and the software project manager regarding the customer's business needs that will be addressed by a project.[15] A critical part of this process is to ensure that the requirements development portion of the effort documents, at a sufficient level of detail, the problems that need to be solved and the objectives that need to be achieved.

Good requirements have several common characteristics:[16]

- They fully describe the software functionality to be delivered. Functionality is a defined objective or characteristic action of a system or component. For example, a system may have inventory control as its primary functionality.[17]
- They provide the source of the requirement. For instance, the citation of the statute, regulation, or industry standard should be shown so that others can evaluate the applicability of the requirement and better understand the impacts of changes in the requirement.
- They state the requirement in clear terms that allow for quantitative evaluation. Specifically, all readers of a requirement should arrive at a single, consistent interpretation of it.

Studies have shown that problems associated with requirements definition are key factors in software projects that do not meet their cost, schedule, and performance goals. For example, see the following:

- A study found that getting a requirement right in the first place costs 50 to 200 times less than waiting until after the system is implemented to get it right.[18]

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[15]Carnegie Mellon University Software Engineering Institute, *The Capability Maturity Model: Guidelines for Improving the Software Process* (Reading, Mass.: Addison Wesley Longman, Inc., 1995).

[16]Karl E. Wiegers, *Software Requirement: Practical techniques for gathering and managing requirements throughout the product development cycle* (Redmond, Wash.: Microsoft Press, 1999).

[17]IEEE 610.12-1990.

[18]Barry W. Boehm and Philip N. Papaccio, *Understanding and Controlling Software Costs* (IEEE Transactions on Software Engineering, volume 14, number 10 1988).

- A survey of more than 8,000 software projects found that the top three reasons that projects were delivered late, over budget, and with less functionality than desired all had to do with requirements management.[19]
- A study found that the average project experiences about a 25-percent increase in requirements over its lifetime, which translates into at least a 25-percent increase in the schedule.[20]
- A study noted that between 40 and 60 percent of all defects found in a software project could be traced back to errors made during the requirements development stage.[21]

Requirements Were Not Specific

The majority of the requirements in the draft RFP lacked the necessary specificity to ensure that the defects in the requirements had been reduced to acceptable levels. Acceptable levels refer to the fact that any systems acquisition effort, such as that being undertaken by the DC Courts, will have some requirements-related defects. However, the goal is to reduce the risks and prevent significant requirements defects in order to limit the negative impact of these defects on the cost, timeliness, and performance of the project. The lack of specificity of the requirements contained in the draft RFP indicate that a significant number of requirements-related defects are present in this document. These requirements-related defects significantly increase the likelihood that the resulting system will not meet DC Courts' cost, schedule, and performance goals. In addition, the risk exists that the DC Courts may have failed to include critical requirements because of the lack of specificity. Omission of critical requirements will also adversely affect cost, schedule, or performance goals. As noted elsewhere, DC Courts officials have agreed with our assessment and have started taking actions to address these weaknesses.

DC Courts' requirements lacked the specific information necessary to understand the required functionality that a vendor should provide and how to determine quantitatively, through testing or other analysis, whether a vendor's product would adequately address the DC Courts' needs. For examples, see the following.

[19]The Standish Group, *Charting the Seas of Information Technology* (Dennis, Mass.: The Standish Group, 1994).

[20]Capers Jones, *Assessment and Control of Software Risks* (Englewood Cliffs, N.J.: Yourdon Press, 1994).

[21]Dean Leffingwell, *Calculating the Return on Investment from More Effective Requirements Management* (American Programmer, 1997).

- One requirement stated that the "[s]ystem must accept e-filing documents and case management data in XML[22] standard format and then update the case management system with the case filing data, case filing fees, and store the document." Deficiencies in this requirement include (1) the XML "standard" format is not defined, (2) the business rules that should be used to compute the filing fees are not referenced, and (3) the response time and capacity (for example, number and size of documents) was not specified.

- Another requirement stated that the system must have the "[a]bility to link [a] case with other related cases having the same case participants or family unit, because the overall concept in the family court is one family, one judge." However, the document did not specify such items as (1) the individuals that should be considered part of the family unit (for example, mother, father, stepmother, aunt, sister, nephew, guardian, etc.) or (2) what are considered related cases (for example, criminal, civil, probate, etc.).

- A user requirement stated that the system must have the "[a]bility to move quickly between screens. Must have the ability to change screen navigation per each individual user requirement." However, the term "quickly" was not defined nor was there a description of how users should define the screen navigation.

- Another requirement stated that the system must have the "[a]bility to electronically notify users based on user defined rules when [a] user defined event has or has not occurred in a timely manner by either FAX or e-mail." Ambiguities in this requirement include (1) the rules that users can define, (2) the functional method that a user applies to define a rule, (3) whether the rules are established by each user or whether "corporate" rules will be defined, (4) what is considered "timely," and (5) who are considered users (that is, the reason why DC Courts personnel receive faxes instead of e-mail from their own system).

Another important aspect of requirements definition includes defining key terms. In its RFP, the DC Courts did not clearly define the terms "customization" and "modification," nor did it require that the vendor communicate the cost, schedule, and performance impacts of implementing a customization or modification associated with a given requirement.

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[22]The Extensible Markup Language (XML) is a flexible, nonproprietary set of rules for tagging information so that it can be transmitted using Internet protocols and processed by disparate computer systems.

The terms "customization" and "modification" may be confusing since a basic premise is that COTS solutions should not be customized or modified. The terms "customization" and "modification," as used in this report, are differentiated from the basic installation processes that are required for systems such as IJIS. Those processes are commonly referred to as installation and configuration. For purposes of this report, we are defining customization and modification as follows:

- Customization: The process of setting parameters within the application to make it operate in accordance with the entity's business rules. Customizations are normally supported by the vendor in subsequent upgrades as part of the normal upgrade process.
- Modification: The process of writing or changing code. Modifications are not generally supported by the vendor in subsequent upgrades as part of the normal upgrade process.

A customization in one package may be considered a modification in another package. For example, the architecture of one product may allow the entity to develop a report tailored to its needs in such a manner that, when the system is upgraded, the report will still be available without additional development work. However, the same report in another system may need to be rewritten when the system is upgraded. Defining these terms is important to ensure that the benefits associated with any customizations or modifications are cost-effective and that alternatives are not available.

Unclear Relationship to Industry Standards

In a number of cases the requirements in the DC Courts' draft RFP did not directly relate to industry standards published by the consortium. The consortium has been tasked with developing guidelines that will help state courts more effectively use their financial and staffing resources to obtain state-of-the-art computer systems—either through in-house development or through procurement from software developers. In doing so, the consortium has focused on ways in which the state courts can

- reduce the time needed to obtain a new computer system,
- improve work processes, and
- reduce staffing requirements.

Recognizing the state courts' need for functional standards in computer systems and the staffing limitations that exist in most state courts, the consortium has developed a set of functional standards for developing new computer systems. Courts nationwide would use these standards to define functional requirements for in-house systems development and

RFPs for vendor-supplied systems. Each court must customize the standards and add terminology, details, and specificity based on local and state procedures, policies, and customs.

DC Courts officials and the contractor told us that the requirements in the DC Courts' draft RFP were based on the published standards developed by or currently under development by the consortium. However, for many of the requirements in the draft RFP, there was no direct link, or cross-referencing, to the standards. For example, one standard calls for generating a receipt and assigning a case number when a case file is received, but the draft RFP requirement does not track back to the industry standard and only speaks vaguely of notifying users and generating receipts. Table 2 compares one of the standards to some of the draft RFP's requirements.

Table 2: Comparison of Industry Standard and RFP's Requirement

Industry standard	Draft RFP requirement
Generate receipt for or notify appropriate parties that case filing was received and accepted, and give them assigned case number (notice, including electronic acknowledgment, would apply primarily when a case is transferred from another jurisdiction or filed electronically).	Ability to electronically notify users based on user-defined rules when user defined event has or has not occurred in a timely manner by either FAX or e-mail. Ability to automatically generate a receipt upon the filing of a notice of appeal stating the case number, date, and time of filing. System should not allow a case to proceed until filing fee is collected. Ability to issue a sequentially numbered receipt for the payment of funds on a specific case.

We were also unable to identify in the draft RFP items contained in the industry standards that applied to the DC Courts. For example, one standard required the system to "[g]enerate locally defined case title or style (i.e., a short phrase that identifies case and includes plaintiff and defendant names) from party names and other information." We were not able to readily identify a related requirement in the draft RFP.

Regardless of whether the draft RFP contained all the industry standards that were applicable, the real key is that the draft RFP did not provide adequate information so that the prospective vendors and others could readily map systems built upon these standards to the needs of the DC Courts. This lack of vital information could lead to adverse impacts as

vendors attempt to rework or develop functions that were not clearly understood initially. This, in turn, could lead to cost increases, schedule delays, and reduced performance.

Poor Organization Prevents Requirements Validation

Requirements should be organized logically to facilitate understanding and requirements validation efforts. The organization of the requirements in the draft RFP hampers the DC Courts' and potential contractors' ability to understand and validate the requirements since it is very difficult to determine where all the requirements related to a given functionality are documented. Because the requirements were not logically organized, future validation efforts to identify missing or duplicate requirements may not be effective.

Requirements validation reduces requirements-related defects by first assessing whether the requirement document actually satisfies the project's top-level requirements. The verification process includes ensuring that the

- requirements document describes the intended system behaviors and characteristics;
- requirements are correctly derived from requirements obtained from other sources, for example, if the requirements document states that a given statute requires a certain function, then an effort is undertaken to ensure that the requirement correctly represents the specified statute;
- requirements are complete, consistent, and of high quality; and
- requirements provide an adequate basis to proceed to the next stage of system development.

Requirements validation is intended to help ensure that the requirements are complete, correct, feasible, necessary, prioritized, unambiguous, and verifiable.[23] The organization of the requirements in the draft RFP will likely hinder such a process. For example, see the following:

- One section, entitled "Case Financial Activity Requirements," contained many of the financial-related requirements such as preparing a monthly trial balance and balance sheet. However, another section, entitled "Reporting," contained the requirement to produce a Statement of Revenue and Expenses. Generally, all requirements related to financial statement reporting would be contained in the same section.

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[23]Karl E. Wiegers.

- The requirements contained in the "Case Financial Activity Requirements" section were not organized in a functional manner. Disbursement requirements were followed by adjusting entry requirements, which were followed by additional disbursement requirements, which were followed by receipt requirements, which were followed by additional disbursement requirements. In an appropriately organized requirements document, all related requirements would be grouped together.
- Bar coding requirements for court documents were contained in at least three different sections rather than all in the same section.

DC Courts Has a Reasonable Basis to Assume a Commercial Product Will Meet Its Needs

The DC Courts intends to use the acquisition process to identify any potential gaps between its system requirements and the standard features available in a given vendor's product instead of performing a detailed gap analysis before the RFP is issued. Although this approach can increase risk, we believe the DC Courts' decision to use the acquisition process to identify the cost, schedule, and performance gaps is acceptable in this case because of the following mitigating factors.

- DC Courts officials concluded, based on a qualitative analysis, that they do not have unique requirements that would prevent the utilization of a COTS product. Furthermore, they recognized that a gap analysis must be performed as part of the vendor selection process to identify the cost, schedule, and performance impacts of each vendor's product before deciding which product to acquire.
- DC Courts is still in the early stages of the system acquisition effort and has not yet reached the critical point of contract award. Therefore, a gap analysis can still be performed prior to the system acquisition to ensure that a COTS product can cost effectively meet DC Courts' needs.
- As noted previously, the requirements that had been developed lacked the necessary specificity to perform a meaningful gap analysis. Therefore, the time spent on attempting to perform the gap analysis before issuing the RFP may not have been effective.

As with any effort, alternative approaches need to be analyzed. In this case, DC Courts officials believe that the benefits associated with the reduced risks of performing a detailed gap analysis before the RFP is issued—having a greater assurance that a COTS product would meet their needs—were outweighed by the costs associated with delaying this effort.

A critical step in acquiring a new system is determining whether the system requirements can be met by using commercially available systems, commonly referred to as COTS systems. If COTS systems cannot meet the

majority of the requirements, then the acquirer will need to undertake a system development effort rather than using a COTS product. To make this determination, the agency must perform a gap analysis that systematically and quantitatively compares and contrasts the vendors' products against the agency's requirements based on functional, technical, and cost differences.

Two different approaches can be taken to perform this gap analysis. One approach is to perform a gap analysis on the detailed requirements to determine whether they need to be modified before issuing the RFP for acquiring a system. A second approach is to structure the acquisition process so that the vendor identifies the gaps as well as the cost, schedule, and performance impacts of addressing those gaps. Each approach has its advantages and disadvantages. For example, if a detailed gap analysis is performed before the acquisition process begins, and it is later determined that a COTS product could have cost effectively met the agency's needs, then time and money have been wasted performing an analysis that, in effect, will be repeated during the acquisition process. On the other hand, if the second approach is taken and the gap analysis discloses that a COTS product cannot cost effectively meet the agency's needs, then the acquisition process will need to be restructured to support a system development effort, which translates into schedule delays and additional costs.

DC Courts officials selected the second approach—using the acquisition process to identify their project's cost, schedule, and performance gaps. According to these officials, they selected this approach because they had

- reviewed a number of vendors' products and believed they had a good understanding of the general capabilities of the marketplace;
- hired a contractor that was knowledgeable of the court environment to help them understand whether a COTS product would meet their needs;
- determined that, based on interactions with other courts of similar size and workload, the DC Courts can successfully use comparable practices; and
- already committed to modifying their business processes to reflect the selected COTS product's capabilities unless a significant reason, such as a legal requirement, dictated otherwise.

In discussing this issue with DC Courts officials, they acknowledged that the approach they were taking increased risks; however, they believe that the benefit obtained—accelerating the implementation of a badly needed system—justifies those risks.

Actions Taken by DC Courts to Address Our Concerns

In late October 2001, we discussed our findings on the above three areas with DC Courts officials. They generally agreed with our findings and restated their commitment to only go forward with this project when the necessary actions had been taken to reduce the risks to acceptable levels. They specifically agreed to perform the following actions:

- Delay the procurement of the new system until the requirements can be revised to provide assurance that defects related to the requirements are kept to acceptable levels. They have begun the process of selecting a contractor that will be responsible for developing a new requirements document. They also stated that the contractor would be responsible for documenting the requirements so that each requirement (1) fully describes the system functionality to be delivered, (2) includes the source of the requirement, and (3) is stated in unambiguous terms that allow for quantitative evaluation.
- Develop a plan that can be used to guide DC Courts' effort to implement the necessary disciplined processes. This includes identifying the needed skills, determining the best approach to acquiring the needed skills through training of DC Courts' staff or through contractors, and securing adequate funding.

Conclusions

DC Courts' planned actions and those taken thus far to address our findings are a positive step forward and, if effectively implemented, will help reduce the risks associated with this effort to acceptable levels. We are reaffirming these actions in our recommendations. Although the DC Courts has a reasonable basis for believing that a COTS product will meet its needs, it has not yet defined the requirements adequately or implemented the disciplined processes necessary to reduce the risks to the project to acceptable levels—that is, to reduce the risks associated with disciplined processes and prevent significant requirements-related defects in order to limit the negative impact on the cost, timeliness, and performance of the project. DC Courts has stated its commitment to correcting the deficiencies in its requirements as well as performing a gap analysis during the preliminary phases of its acquisition project before it commits large amounts of resources. If properly implemented, these steps should serve to reduce overall project risk and reduce the likelihood that extensive and costly corrections will be needed later.

Recommendations

To help ensure that the DC Courts reduces risks associated with its systems development and implementation and increase the chances of a successful effort, we recommend that the Joint Committee on Judicial Administration in the District of Columbia take the following actions:

- Develop a plan on how it will implement the disciplined processes necessary to reduce the risks associated with this effort to acceptable levels. This plan should include the processes, such as those identified by SEI and IEEE, that will be implemented and the resources, such as staffing and funding, needed to implement the necessary processes effectively.
- Develop requirements that contain the necessary specificity to reduce requirements-related defects to acceptable levels and add them to the draft RFP. The requirements management process used to develop and document the requirements should be adequate to ensure that each requirement (1) fully describes the functionality to be delivered, (2) includes the source of the requirement, and (3) is stated in unambiguous terms that allow for quantitative evaluation.
- Organize the requirements document to facilitate the requirements validation process used by disciplined organizations.
- Ensure that the acquisition process is adequate to (1) clearly define the terms customization and modification and (2) ensure that vendor responses clearly communicate the cost, schedule, and performance impacts of implementing a customization or modification associated with a given requirement.
- Evaluate the cost, schedule, and performance impacts of the customizations and modifications identified during the system acquisition process and ensure that the benefits are cost-effective and that alternatives to customization or modification are not available.

DC Courts Comments

In commenting on a draft of our report, DC Courts agreed with our findings and recommendations and said that it has begun to implement our recommendations to ensure the successful acquisition of IJIS as outlined in our report. Specifically, DC Courts said that it is implementing the disciplined processes critical to successful systems acquisition. DC Courts also noted that it has a project under way to institute the necessary disciplined processes for the entire system development life cycle (SDLC). DC Courts further noted that it is contracting with subject matter experts in both the SDLC disciplines and court operations to increase the specificity in the RFP and to reduce the risks from requirement-related defects to acceptable levels. DC Courts provided additional details on the actions taken to address the findings and recommendations included in our report. If these actions are successfully implemented, they will address our concerns and help ensure the success of the DC Courts' IJIS acquisition. The DC Courts' comments are reprinted in appendix I.
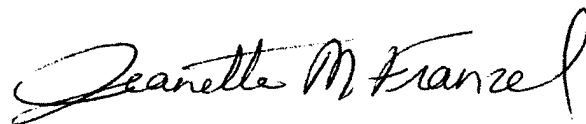
We are sending copies of this report to the ranking minority member of your subcommittee and to other interested congressional committees. We

are also sending copies to the Joint Committee on Judicial Administration in the District of Columbia, the chief judge of the Superior Court of the District of Columbia, and the executive director of the District of Columbia Courts. Copies of this report will also be made available to others upon request.

Please contact me at (202) 512-9406 or by e-mail at franzelj@gao.gov if you or your staff have any questions concerning this report. Key contributors to this report were Linda Elmore, John C. Martin, Meg Mills, and Norma Samuel.

Sincerely yours,

Jeanette M. Franzel
Acting Director, Financial Management and Assurance

Appendix I: Comments from the District of Columbia Courts

District of Columbia Courts
500 Indiana Avenue, N.W., Room 1500
Washington, D.C. 20001-2131
202 879-1700
202 879-1829 Fax

Anne B. Wicks
Executive Officer

February 8, 2002

Jeannette M. Franzel
Director, Financial Management and Assurance
United States General Accounting Office
Washington, DC 20548

Dear Ms. Franzel:

In accordance with your request of January 25, 2002, I enclose for your consideration comments on behalf of the District of Columbia Courts to the draft report entitled *District of Columbia Courts: Disciplined Processes Critical to Successful System Acquisition.*

The District of Columbia Courts have carefully reviewed the GAO report findings and are implementing the recommendations to ensure the successful acquisition of the Integrated Justice Information System (IJIS). If you have further questions or concerns, please contact me at (202) 879-1700.

Sincerely,

Anne B. Wicks
Executive Officer
D.C. Courts

Attachment

COMMENTS OF THE D.C. COURTS

According to the General Accounting Office (GAO), an initial review was conducted of
the DC Courts' effort to acquire a new information system to determine whether:

1) DC Courts implemented the disciplined process for this report to reduce the risk
   associated with this effort to acceptable levels;
2) DC Courts' requirements to acquire the system, as identified in its draft RFP, contain
   the necessary specificity to reduce the risks from requirement defects to acceptable
   levels; and
3) DC Courts performed the necessary actions to determine that a commercial off-the-
   shelf system (COTS) would meet its needs.

COURT SUMMARY IN BRIEF

1) The DC Courts have begun to implement the disciplined processes critical to
   successful system acquisition as outlined in the draft GAO report. Additionally, a
   project is underway which will institute the necessary disciplined processes for the
   entire system development life cycle (SDLC), especially for the acquisition,
   installation, testing and acceptance of a new major system.
2) The DC Courts are contracting subject matter experts in both the SDLC disciplines
   and court operations, to increase the specificity in the RFP and to reduce the risks
   from requirement defects to acceptable levels. State of the art technology software
   for requirements management will be utilized.

FINDING: DC Courts have not implemented the disciplined processes necessary to
reduce risks to acceptable levels.

COURT RESPONSE: As indicated in the GAO report, the Court recognizes the need
for disciplined processes and plans on implementing such processes once funding for the
integrated justice information system (IJIS) project is available. In an effort to reduce the
risks to acceptable levels, two measures are currently underway:

- At the time of the GAO review, Court staff from the Information Technology
  Division, Administrative Services Division, and the Budget and Finance Division
  were attending a project management course offered through the Boston University
  Management Certificate Program. In December 2001 ten staff received their Project
  Management certificates. Another team of personnel from the Courts are enrolled
  this semester. Additionally, senior court managers will receive project management
  training conducted by the Institute for Court Management from February 27 through
  March 1, 2002, further demonstrating the Court's commitment to implementing the
  disciplined processes necessary to reduce risks to acceptable levels.

- The Information Technology Division began an analysis of software tools for use in the discipline of specification management, change management, risk management and testing. The Court selected the Rational Suite Enterprise Studio as the tool to attain the Capability Maturity Model (CMM). Using the Rational Unified Process software the Court will begin to move from Level 1 (Ad hoc) to Level 2 – Repeatable and Level 3 – Defined maturity levels of the Software Engineering Institute's (SEI) Capability Maturity Model (CMM). Also, the Court has solicited proposals for consulting assistance to install the software, train staff, and develop the necessary implementation procedures. Throughout the acquisition and life cycle of the project, the Court will use the Rational Unified Process software.

FINDING: DC Courts system requirements as specified in RFP are inadequate.

COURT RESPONSE: In accordance with this finding, the Court has taken immediate steps to adequately define the system requirements so that they will contain the necessary specificity and more closely relate to the Court's business operations. The National Center for State Courts, our original contractor, will assist in the refinement of the systems requirement. To mitigate risks, the Court will organize the system requirements logically and relate the requirements to industry standards.

FINDING: Unclear Relationship to Industry Standards

COURT RESPONSE: The Court will revise the Request for Proposals (RFP) utilizing the Case Management Functional Standards produced by the National Center for State Courts (NCSC). With the assistance of the NCSC, our original contractor, the Court will revise the RFP to include more specificity, including direct linkages, or cross-referencing to industry standards. The tasks that will be conducted to achieve industry standards follows:

I. Obtain consulting assistance to draft a working document (initial functional specifications) for users sessions. This would utilize information from the current RFP, Volumes 1-4 of the business and technology analysis and the current draft and final Case Management (CM) Functional Standards produced by NCSC.
II. Conduct user sessions to review the working document with the various court divisions.
III. Draft a functional requirements document, using the requirements specification tools which also assists in the cross referencing of specifications to requirements and organizes the information to facilitate the requirements validation process.
IV. Revise RFP using new functional requirements document.
V. Revise the acquisition process to ensure adequacy of clearly defined terms such as customization and modification so that vendor responses clearly communicate the cost, schedule, and performance impacts of implementing a customization or modification associated with a given requirement.
VI. Conduct a quality review by the NCSC and other consultant specialists.

VII.   Review comments by the reviewers to the Draft RFP.
VIII.   Finalize RFP.

During the vendor response evaluation process, the Court will evaluate the cost, schedule, and performance impacts of any customizations or modifications identified during the system acquisition process to ensure that the benefits are cost effective and that alternatives to customization or modification are not available.

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